

CLAIMS

1. A cooling system for electronic equipment enclosures with densely packed components comprising:
 - an electronic equipment enclosure;
 - a rack mounted within said enclosure;
 - a plurality of boards mounted to said rack, at least one of said boards having a plurality of heat generating components mounted thereon;
 - a plurality of microscale cooling assemblies each one of said cooling assemblies being connected to one of said plurality of heat generating components, each cooling assembly including a heat insulative housing, an inlet port formed in said housing for receiving a heat transferring fluid, an outlet port formed in said housing for passing said heat transferring fluid, a thermally conductive element connected to said housing, an evaporator chamber formed by said housing and said thermally conductive element upstream of said outlet port and a capillary passage formed in said housing between said inlet port and said evaporator chamber;
 - a first intake manifold mounted to said rack;
 - a first exhaust manifold mounted to said rack;
 - a second intake manifold mounted to said board and to said first intake manifold;
 - a second exhaust manifold mounted to said board and to said first exhaust manifold;
 - a first fluid conduit connecting said board mounted second intake manifold and each of said plurality of cooling assemblies;
 - a second fluid conduit connecting said board mounted first exhaust manifold and each of said plurality of cooling assemblies;
 - a compressor;

a third fluid conduit connecting said rack mounted first intake manifold and said compressor; and

a fourth fluid conduit connecting said rack mounted first exhaust manifold and said compressor.

2. The system of claim 1 wherein:

said rack includes a rail; and

said plurality of boards are mounted to said rail.

3. The system of claim 1 including:

a backplane connected to said rack; and wherein

said plurality of boards are mounted to said backplane.

4. The system of claim 1 including:

a backplane connected to said rack; and

said first intake manifold and said first exhaust manifold are connected to said backplane.

5. The system of claim 1 including:

a backplane connected to said rack; and wherein

said rack includes a rail;

said first intake manifold and said first exhaust manifold are connected to said backplane; and

said plurality of boards are mounted to said rail and to said backplane.

6. The system of claim 1 including:

a hybrid electronic package having a layer of d-c electronics and controls, a cover and a ceramic hybrid power module including components and an array of cooling assemblies.

7. The system of claim 6 including:
a hybrid electronic package having a layer of d-c electronics and controls, a cover and a ceramic hybrid power module including components and an array of cooling assemblies.
8. A cooling system for densely packed heat generating components comprising:
a board having a plurality of heat generating components mounted thereon;
a plurality of microscale cooling assemblies each one of said cooling assemblies being connected to one of said plurality of heat generating components, each cooling assembly including a heat insulative housing, an inlet port formed in said housing for receiving a heat transferring fluid, an outlet port formed in said housing for passing said heat transferring fluid, a thermally conductive element connected to said housing, an evaporator chamber formed by said housing and said thermally conductive element upstream of said outlet port and a capillary passage formed in said housing between said inlet port and said evaporator chamber;
an intake manifold mounted to said board;
an exhaust manifold mounted to said board;
a fluid conduit connecting said intake manifold and each of said plurality of cooling assemblies; and
a fluid conduit connecting said exhaust manifold and each of said plurality of cooling assemblies.
9. The system of claim 8 including:
a backplane connector mounted to said board.
10. The system of claim 8 including:
a face plate mounted to said board.
11. The system of claim 8 including:

a set of grooming clips mounted to said board.

12. The system of claim 8 including:

a backplane connector mounted to said board; and

a face plate mounted to said board.

13. The system of claim 12 including:

a set of grooming clips mounted to said board.

14. A hybrid electronic package for an electronic equipment enclosure comprising:

a layer of d-c electronics and controls;

a cover connected to said layer;

a ceramic hybrid power module including components connected to said cover;

an array of cooling assemblies connected to said module;

a compressor;

a condenser; and

two conduits connecting said compressor and said condenser and said array of cooling assemblies.